AN ANALYSIS OF THE MEDICAL PROBLEMS OF THE CIVIL WAR

ALFRED JAY BOLLET*

DANBURY

During our Civil War, there were over 620,000 military deaths. About two-thirds of these deaths were due to disease, yet disease is rarely mentioned in ordinary histories of the war.

Today I plan to analyze some of the medical aspects of that war from the standpoint of today's understanding, and to discuss some of the epidemiological patterns they illustrate. In prior wars, disease was even more frequent, but the records kept during our Civil War provide us with excellent data. The voluminous records of medical experiences are in the *Medical and Surgical History of the War of the Rebellion*, published by the Federal Surgeon General's Office in the 1870's and 80's (1). It was the first work of its character and magnitude, and in Europe it was considered the first academic accomplishment of American medicine. It is my main source of epidemiological data.

Similar records were kept by the Confederates, but were burned when Richmond fell. Published recollections of individual physicians, however, reveal that the Confederate experiences were similar (2, 3, 4) but I will limit my discussion to the more complete Union data.

Studies of the war are aided by pictorial records, thanks to early photographers and itinerant artists. Photos of individual clinical cases, as well as autopsy specimens exist. Numerous published case histories with descriptions of autopsies reveal a lot about the diagnoses made by Civil War physicians. Further, Joseph Woodward, one of the main authors of the *Medical and Surgical History*, did some of the earliest tissue stains and photomicrography. His slides are still available at the Army Medical Museum, and I have reviewed many of them.

At the time of the Civil War, most diseases which we call infectious were not thought to be contagious, but rather to be due to miasmas, or ill winds, as in malaria. The sickening odors in military camps of the time supported this anti-contagionist concept. Initially, sanitation was abysmal; men used to relieving themselves in bushes behind their house didn't see any reason to change habits. Men rarely washed, and entering

* Clinical Professor of Medicine, Yale University School of Medicine, Vice President for Academic Affairs, Danbury Hospital, Danbury, CT 06810

(Send reprint requests to the above address.)

a tent which had housed overnight a dozen men was described as "a memorable olfactory experience."

The miasma theory was pragmatically useful, since it led to efforts to prevent odors, especially through improved sanitation. The U.S. Sanitary Commission, an effective civilian lobbying group, which also raised money and provided hospital ships and comforts for the troops, helped to bring about improvements. As the war proceeded, commanders began to see the need to keep the men healthier. As a result, the most frequent diseases diarrhea and dysentery, which I shall discuss in more detail later, caused more deaths than any other disease. At autopsy, ulcerations of the colon were observed in some of the recorded cases, and in a few hepatic abscesses suggest amebiasis to us, but some of the abscesses could have been pyogenic.

When black regiments were organized, they went through the same problems which had affected white troops earlier (Figs. 1 and 2); the incidence of acute diarrhea/dysentery during their first year (fiscal 1864) was much higher than among white troops that year, but similar to that among white troops during their first year. (These troops were called "colored" at the time, and the data for disease among them is given using that term, hence my use of it.)

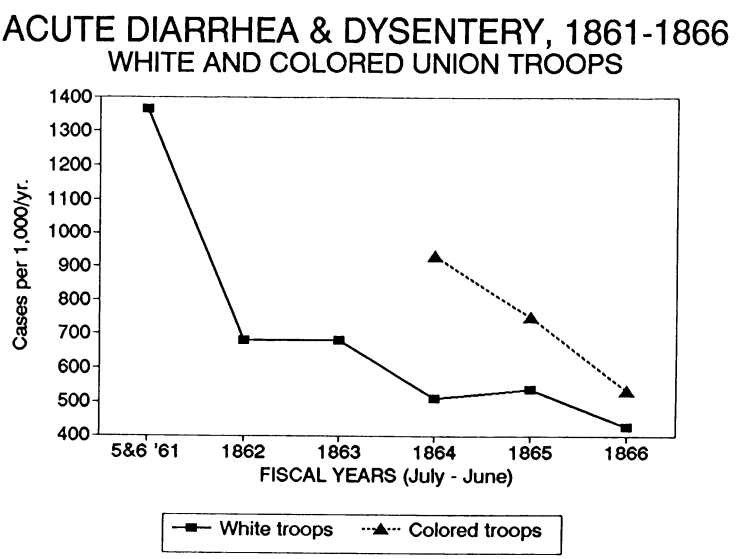

FIG. 1. Incidence of acute diarrhea and dysentery among Union troops during May and June of 1861 and each succeeding fiscal year. (Fiscal years began on July 1.) Incidence data in all figures are calculated on the basis of cases per 1,000 mean strength (including men in general hospitals) per year. The figures for May and June, 1861 are annualized.

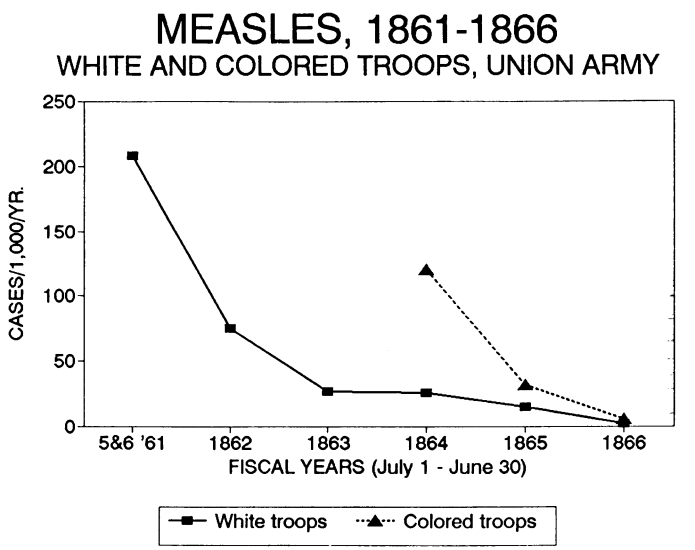

FIG. 2. Incidence of measles among white and colored Union troops, May and June, 1861 to end of fiscal year 1866.

Diarrhea was so common that the expression arose that a man "had to have good guts to be a good soldier." Men resented being told that they "didn't have the guts to stand it" (2). "Guts" came to mean bravery and other soldierly qualities; this usage first appeared in a dictionary of slang terms in 1893 (5).

The next most common disease was intermittent fever, also called malaria. It was associated with emanations from swamps and was most common in coastal areas. Altogether, malaria caused almost a million recorded cases. Colds were extremely frequent, especially among new troops; physicians could tell which tents had recruits in them from the amount of coughing at night (6).

The diseases which caused the most fatalities were chronic diarrhea/dysentery and typhoid fever. Big epidemics of typhoid occurred in the early years, when sanitation and other hygienic measures were mostly ignored (Fig. 3). Late in the war, when new recruits were few, most of the men already had typhoid; physicians at the time knew it gave what we call immunity. In the terrible prison camps of 1864 and 65, where sanitation was worst and mortality highest, typhoid was rare. The men had all had it earlier.

The case fatality rate for typhoid, always high, rose progressively during the war, reaching an appalling 60% during the last full year of fighting. It fell somewhat during demobilization. A similar pattern occurred for many other diseases.

The other major "fevers" diagnosed were remittent, continued and typhomalarial. Figures are given in Table 1. The diagnosis of continued fever was used in 1861 and 62; subsequently the term typhomalarial fever, invented by Joseph Woodward, was used. It was a common diagnosis, almost equalling typhoid in total cases during the years it was in use, but it had a much lower mortality rate. From the case descriptions, I think it is safe to say that it was not typhoid nor was it a form of malaria; we can only guess at what diseases were included in these categories by our nosology; probably it included a variety of systemic infections, including viral diseases. Perhaps we should consider these terms the 19th century equivalent of "F.U.O."

Typhus was surprisingly rare, since all the men were covered with lice and fleas.

The only disease considered contagious was smallpox. There were 18,952 cases of smallpox and varioloid diagnosed during the war years, with an overall mortality of 37.2%; mortality was lower early in the war, increasing in later years (Fig. 4) and decreasing somewhat during the first post-war year.

Outbreaks of smallpox caused great fear, almost inciting mutiny. Mass vaccinations, done without sterile technique and using material from previously vaccinated patients as vaccine, caused almost as much fear.

An epidemic of smallpox occurred among Union troops in the fall of 1863. After returning from giving a speech at Gettysburg, President Lincoln had a mild attack, and, following the practice of the time, he was kept from seeing all the favor seekers who constantly plagued him. He was disappointed by the isolation, saying, "I finally have something I can give everyone."

Another category of disease, "tubercular," included consumption (14,830 diagnosed cases) and scrofula (8,523 cases). The incidence of consumption fell after the first years of the war, partly due to discharges

TABLE 1

Numbers of cases and fatalities from the most common "miasmatic" diseases

Diagnosis	Cases	Deaths	% Mortality
Acute diarrhea and dysentery	1,528,098	9,867	0.6
Intermittent fevers	998,750	5,206	0.5
Remittent fever	327,135	4,855	1.5
Chronic diarrhea and dysentery	211,037	34,691	16.4
Epidemic catarrh	144,262	38	—
Typhoid fever	79,462	29,336	36.9
Measles	76,318	5,177	6.8
Typhomalarial fever	57,400	5,351	9.3
Smallpox and varioloid	18,952	7,058	37.2

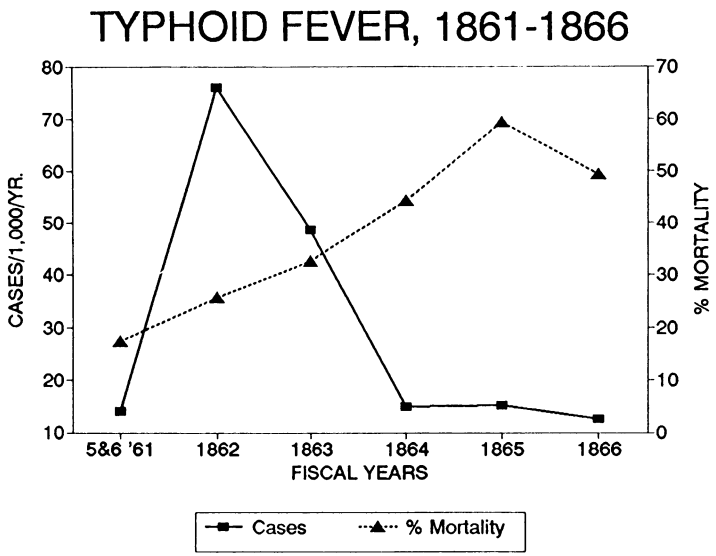

FIG. 3. Incidence and case fatality rate for typhoid fever among white troops in the Union Army, during May and June of 1861 and each succeeding fiscal year. The mortality percentage in this and other figures is based on the total number of cases reported in all Union armies during that year and the total number of deaths attributed to the disease in all armies and general hospitals during the same period.

of soldiers ill when they enlisted, along with improvement in the quality of pre-induction physicals. However, among the cases diagnosed later in the war, the mortality rate rose progressively (Fig. 5).

Another major killer, pneumonia (recorded as "inflammation of the lung") also showed a decreasing incidence but increasing case fatality rate during the war years (Fig. 6).

Other common diseases were not considered "miasmatic"; syphilis and gonorrhea were called "enthetic." There were 102,893 diagnosed cases of gonorrhea (all urethritis was called gonorrhea) and 79,589 of syphilis. The incidence of venereal diseases was highest in the months of May and June of 1861 (Fig. 7), when volunteers were gathering to defend Washington. It rose again in the year after the war, while most of the men were getting honorable discharges.

Early in 1863, a new commander of the Army of the Potomac encouraged prostitutes to visit the troops as a morale measure, and reportedly used their services liberally himself. His name has been associated with the profession—he was General Joseph Hooker. (Some authorities think this usage antedated the Civil War by a few years, but it certainly got a boost during the war; for example, one of the brothels or "fancy houses"

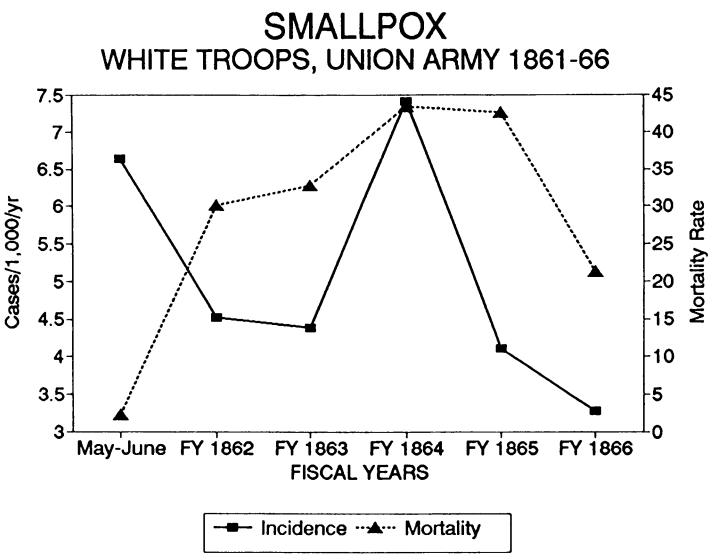

FIG. 4. Incidence and case fatality rate for smallpox among white troops in the Union army.

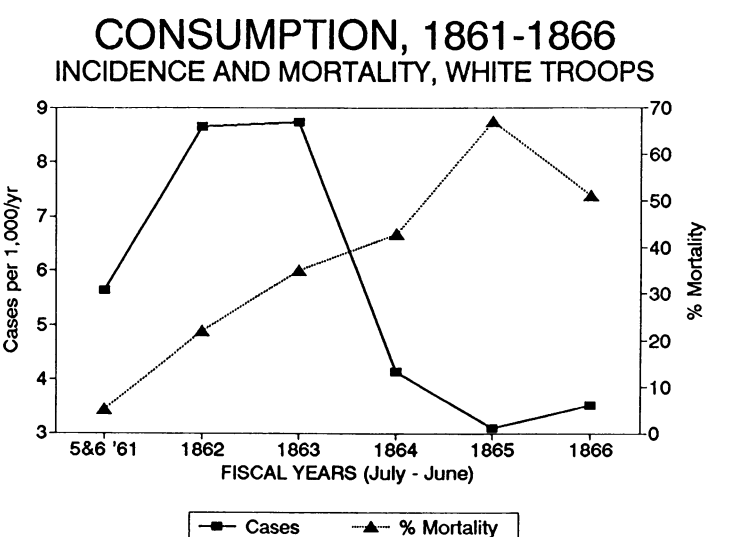

FIG. 5. Incidence and case fatality rate for pulmonary tuberculosis among white troops in the Union army.

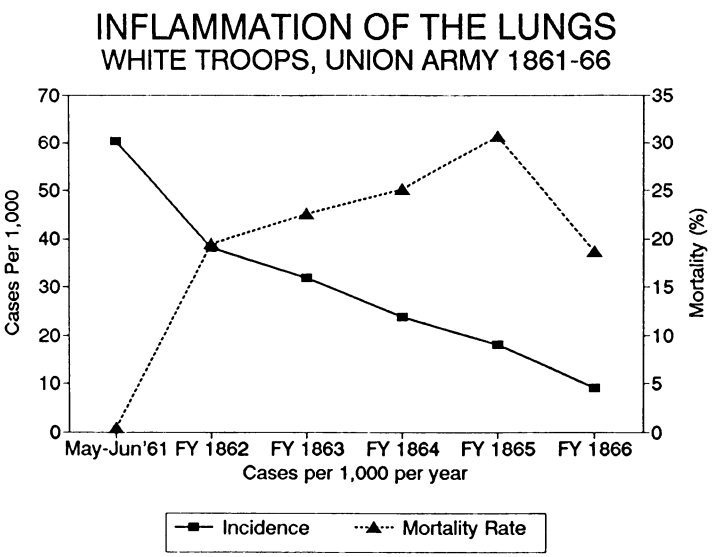

FIG. 6. Incidence and case fatality rate for pneumonia, which was listed under "inflammation of the lungs," among white troops in the Union army.

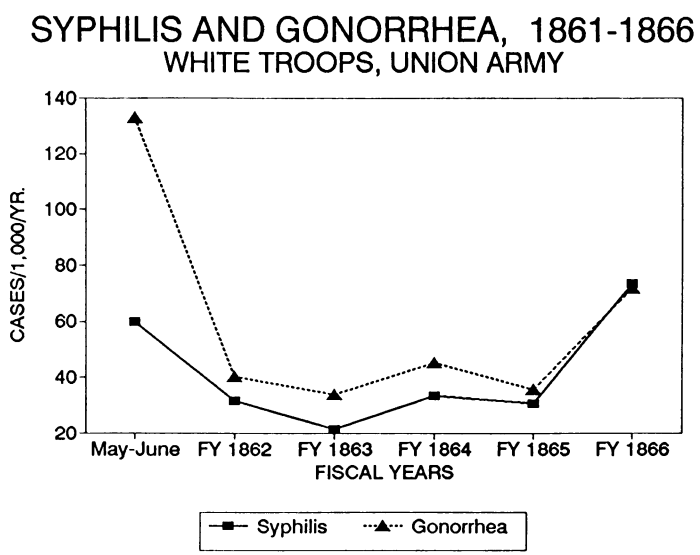

FIG. 7. Incidence of syphilis and gonorrhea among white troops in the Union army.

in Washington City was called "Hooker's Tent" and an entire red light district was called "Hooker's Headquarters" (7).)

A plot of the incidence of venereal disease in the Army of the Potomac (Fig. 8) shows only the barest suggestion of an increase during Hooker's tenure, which ran from late January to mid-May of 1863. The highest incidence that year occurred when the army moved through the area around Washington on its way to and from the battle of Antietam, which took place on September 17, 1862.

Acute and chronic rheumatism, classified as "constitutional" diseases, were extremely common; there were 163,950 cases of acute and 122,813 of chronic rheumatism. Acute rheumatism also was called rheumatic fever. As is shown in Figure 9, their incidence paralleled each other closely; a lot of the chronic rheumatism must have been prolonged acute rheumatism. Rheumatic fever was much more severe and prolonged than in our time, and salicylates were still over a decade away.

Since dysentery was so common, much of the rheumatism could have been Reiter's syndrome. Figure 10 shows that at least some outbreaks of dysentery correlated with outbreaks of rheumatism, while in the winter rheumatism increased without an increase in diarrhea/dysentery, at a time when tonsillitis was most frequent. "Lumbago" was described in many solders (including Robert E. Lee) suggesting spondylarthropathy. Medical discharges were given to 12,653 Union troops for chronic rheu-

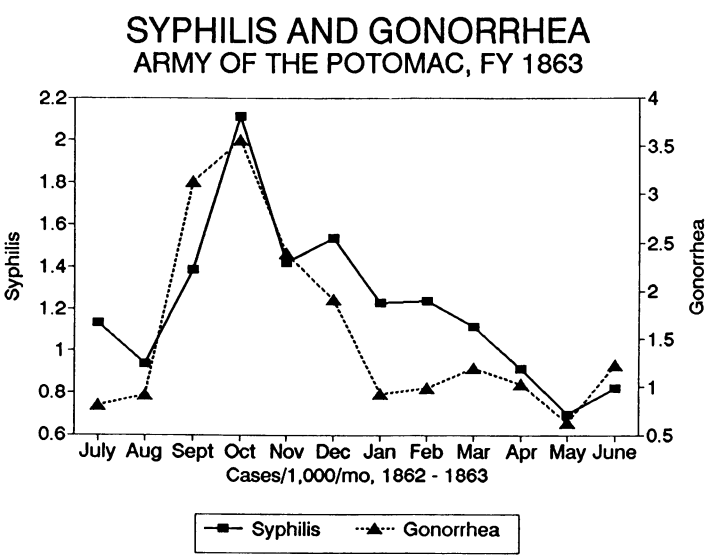

FIG. 8. Incidence of syphilis and gonorrhea in the Army of the Potomac during fiscal 1863.

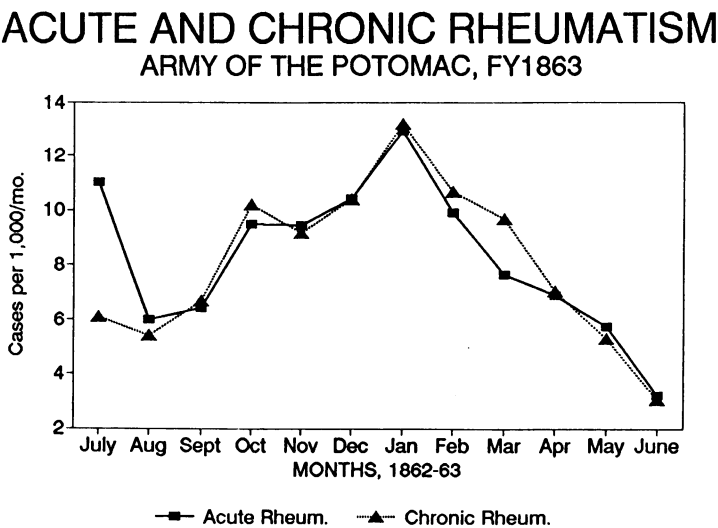

FIG. 9. Incidence of acute and chronic rheumatism in the Army of the Potomac during fiscal 1863.

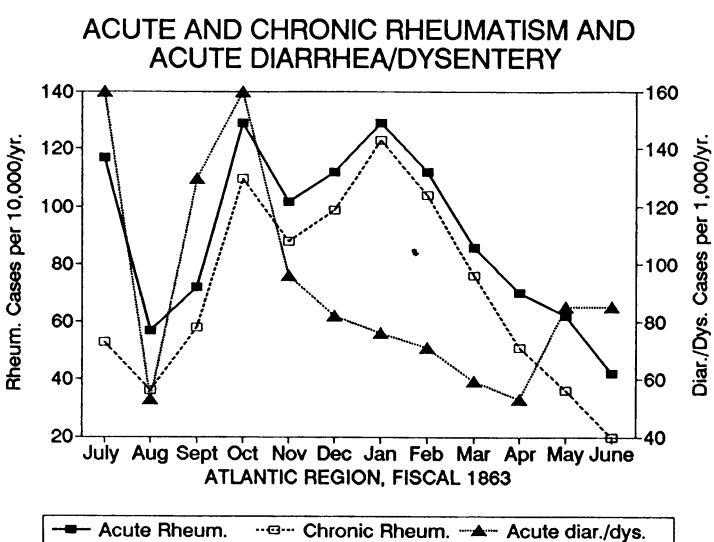

FIG. 10. Incidence of acute and chronic rheumatism and acute diarrhea and dysentery (combined) for all troops in the Atlantic Region (which included the Army of the Potomac) each month during fiscal 1864.

matism (1), another reason to suggest Reiter's syndrome, the most common cause of outbreaks of arthritis in military units now.

Civil War physicians were puzzled that the mortality rate from acute rheumatism in the civilian population was about 3% while among the white troops it was 0.2%; they knew that rheumatism caused heart disease, and added the deaths attributed to pericarditis and endocarditis, noting that the total mortality rate they could relate to rheumatism was still only 0.44%. They could not explain the difference; probably much of the rheumatism was Reiter's syndrome, which had a negligible mortality rate.

A category called "dietic diseases" included scurvy. The descriptions of scurvy were convincing, including mention of gum changes, skin hemorrhages and poor wound healing. Widespread lassitude and unwillingness to work were described in units which had some men affected with florid scurvy. The lack of fresh vegetables was repeatedly blamed for the outbreaks of scurvy.

The diet of Civil War troops was generally monotonous, and almost always lacked vegetables. Hardtack, a tough biscuit, was the main staple. The men liked it, although it was often so stale that even soaking it in boiling water didn't help. Cases of it were labeled "B.C.," meaning they were consigned to the brigade commissary, but the men insisted that it stood for the date of manufacture (2). The main antiscorbutic was "desiccated compressed mixed vegetables," which the men despised, calling it "desecrated vegetables."

Scurvy first became a notable problem during McClellan's Peninsular campaign during the spring and summer of 1862. McClellan's medical staff was surprised, since they thought the men were eating the desiccated vegetables, but a new Medical Director, Jonathan Letterman, increased the supply of antiscorbutic foods such as potatoes and onions, and scurvy was much less of a problem in the Army of the Potomac during later years. The overall incidence of scurvy in the Union forces, however, increased progressively during the course of the war (Fig. 11).

Another classic nutritional deficiency syndrome which affected Civil War troops was night blindness. It was much less frequent that scurvy but correlated with it in incidence (Fig. 11). Physicians considered it a bizarre form of malingering, since affected men had to be led by the hand at night, but could go into battle next morning.

An important component of scurvy at the time was "scorbutic diarrhea," a phenomenon well described in earlier literature; for example, it was called the "scorbutic flux" by Lind(8). During the Civil War physicians noted that deaths from scurvy were usually related to diarrhea, and it is striking that numerous reports from physicians in all regions stated that chronic diarrhea failed to respond to any form of treatment except

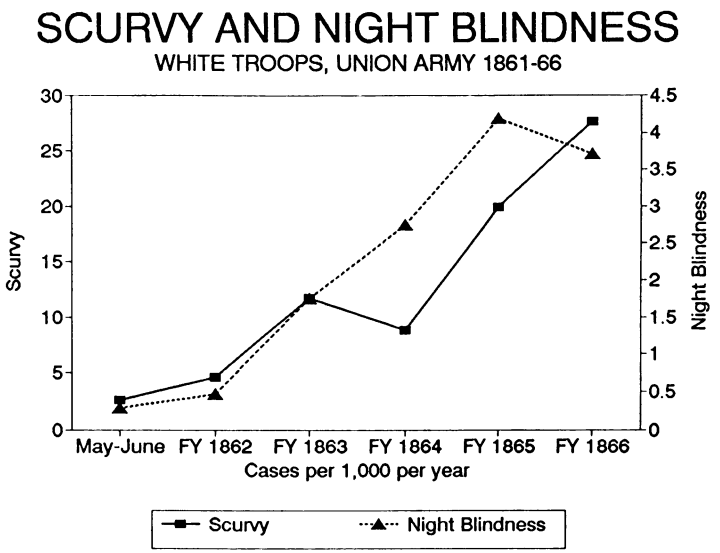

FIG. 11. Incidence of scurvy and night blindness among white troops in the Union Army.

fresh vegetables. They noted that they expected vegetables to aggravate the diarrhea, and were quite surprised at the beneficial effect.

Comparing the incidence of nutritional deficiency syndromes and chronic diarrhea, some relationship is suggested; Figure 12 shows the data for Sherman's army during the campaign against Atlanta, which ended with a siege until the city fell on September 1, and was followed by the March to the Sea and the campaign through the Carolinas. As generally occurred during siege situations, diarrheal disease became more frequent, as did scurvy. Physicians with Sherman's army recorded the lack of vegetables available to the troops during the siege (1). When troops were moving, and were able to forage, as they did during the march to Savannah and through the Carolinas, scurvy and night blindness disappeared, and chronic diarrhea became less frequent.

Men on both sides foraged whenever possible. Although it was officially discouraged most of the time, foraging was the main source of vegetables for most troops, and chronic diarrhea and scurvy were most common when foraging was not possible. The medical problems in prison camps illustrates this phenomenon; as in other situations in which men could not forage, scurvy and chronic diarrhea were ubiquitous, and chronic diarrhea was the main cause of death in the prisons, northern and southern, with scurvy the second most common cause of death (1, 9). Together, they accounted for over 80% of the deaths in Andersonville prison (1, 9). Chronic diarrhea caused more deaths in the entire Union

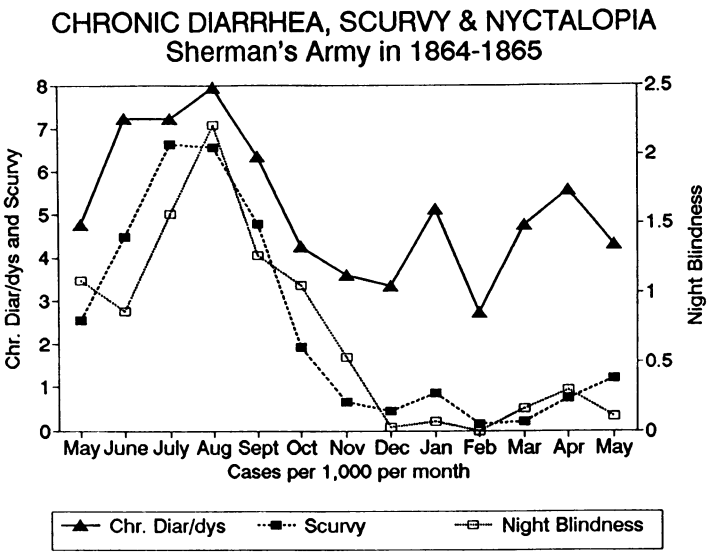

FIG. 12. Incidence of scurvy, night blindness and chronic diarrhea and dysentery (combined) among the men of Sherman's army during the campaign against Atlanta and the March to the Sea and through the Carolinas in 1864 and 1865.

army than any other disease—overall, only slightly fewer than gunshot wounds.

The association of scurvy and diarrhea and the response of both to treatment with a diet rich in vegetables, suggests a nutritional component to at least some of the cases of chronic diarrhea. Folic acid is in mostly the same foods as vitamin C; it has similar water solubility and heat liability. The "megaloblastic anemia of scurvy" was shown to be due to concomitant folate deficiency (10).

In this century, we know that nutritional deficiencies usually involve more than one micronutrient, especially those associated with vegetables. I think that a nutritional component contributed to the etiology of chronic diarrhea at least in some cases, perhaps in association with enteric infection(s). Such a combination is analogous to tropical sprue as we know it, a process which seems to have a microbial etiologic component, but often responds to treatment with folate. Nutritional deficiency may condition susceptibility to the infectious component.

Since this is a history paper, I will quote a Civil War physician, Joseph Woodward on chronic diarrhea: "Originating chiefly among troops in camps, the disease evidently stands in some definite relationship to the usual conditions of camp life. Of these, it would appear most intimately connected with the diet, and this relationship is of such a kind that chronic diarrhea becomes more and more common and fatal as the constitutional manifestations which result from camp diet approach more

and more to the condition of recognizable scurvy, a most important point to be considered in connection with the hygienic treatment of this disease. As a consequence it has more than once happened on a grand scale, during the present war, to see a sudden and palpable diminution in the amount of diarrhea follow the liberal issue of potatoes and onions to an army in which the tendency to scurvy was exhibiting itself . . . (11)."

Much more data could be discussed, especially regarding the surgical experiences. For example, the frequency of amputations led to Civil War physicians being called "sawbones," but the mortality rate from amputations was about half that among civilians during the same years, and during the Crimean war five years earlier, and Franco-Prussian war, six years after, mortality rates from amputations were higher than during our Civil War (1). Both sides analyzed their experiences as the war proceeded, publishing it in both northern and Confederate journals, and modifying practices on the basis of that experience. For example, the data for Lee's Army of Northern Virginia, published in the *Confederate States Medical and Surgical Journal* during 1864 (12), showed that early amputation had a lower mortality rate than "secondary amputation." They decided to continue their practices, despite criticism at the time (and since) for being too quick to decide to do amputations.

In conclusion, Civil War physicians left an excellent record of their experiences. There was a great deal of clinical and climatological analysis of the data. Considering the level of medical knowledge of the time, in general, they did a commendable job, and I say that despite their reputation.

Analysis of the data for disease during the war reveals a lot about the nature of the medical problems of the mid-nineteenth century. A pattern of increasing mortality rates during the course of the war, and an increasing frequency of diagnosed nutritional deficiency syndromes, suggests that a component of malnutrition affected the infectious diseases that were so common.

Nutritional problems of Confederate troops were much more severe, throughout the war, and especially during the last year. The effects of disease and malnutrition on the performance of Civil War troops deserves more attention from military historians.

And, I might add that when we use the term guts to mean bravery, we are commemorating the most common disease problem of the Civil War, and the bravery of all the troops of that war, facing disease as well as bullets.[#]

[#] Recently an article (13) on diarrheal disease during Operation Desert Storm pointed out that it was the most common medical problem during that war, reaching an incidence of 50 to 100 cases per 1,000 soldiers *per week*. The authors stated that diarrheal disease was a major threat to U.S. military forces during that war. Military technology changes, but some things do not.

REFERENCES

1. Surg. Gen'l Joseph K. Barnes, *Medical and Surgical History of the War of the Rebellion.* (Medical Volumes.) Washington: Gov't Printing Office; 1870–88.
2. James I. Robertson, Jr. *Soldiers, Blue and Grey.* Univ of South Carolina Press; 1988.
3. Bell Irvin Wiley, *The Life of Johnny Reb.* Cornwall, NY: Cornwall Press; 1943.
4. H. H. Cunningham, *Doctors in Gray, The Confederate Medical Service.* Gloucester, MA: Peter Smith; 1970.
5. Eric Partridge. *A dictionary of slang and unconventional English.* New York: MacMillan Co.; 1956.
6. Paul E. Steiner. *Disease in Civil War. Natural Biological Warfare, 1961–1965.* Springfield, IL: CC Thomas, Pub.; 1968.
7. Margaret Leach. *Reveille in Washington.* New York: Harper & Bros.; 1941.
8. James Lind. *Treatise on the Scurvy.* London; 1772. (Repub. Classics of Medicine Library, Birmingham: 1980.)
9. Joseph Jones. "Treatment of prisoners during the war," *Southern Historical Society Papers,* 1876; 1: 176.
10. Zalusky, R and Herbert, V. Megaloblastic anemia in scurvy with response to 50 mcg of folic acid daily. *New Eng. J. Med.* 1961; 265: 1033.
11. Joseph Janvier Woodward, *Outline of the Chief Camp Diseases of the U.S. Armies.* (Philadelphia: J. B. Lippincott & Co.; 1865. (Republished, New York: Hafner Publishing Co.; 1964.)
12. F. Sorrel. Gun-shot wounds, Army of Northern Virginia. *Conf. States Medical and Surgical Jour.* 1864; 2: 153. (Republished 1976 by the New York Academy of Medicine.)
13. Kenneth C. Hyams et al. Diarrheal Disease during Operation Desert Shield. *New Eng. Jour. Med.* 1991: 325: 1423.